NASA SBIR/STTR Technologies

Phase I SBIR Contract No. NNX10CD42P - *Temperature Sensing Solution for Cryogenic Space Engines*

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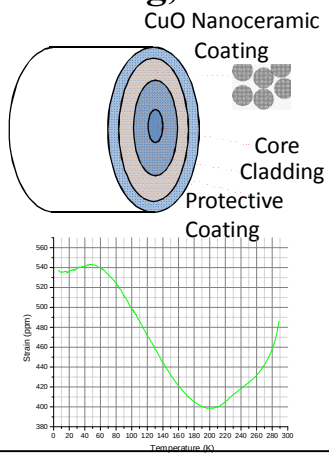
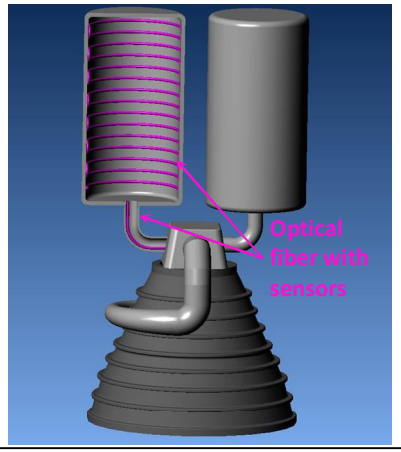
Identification and Significance of Innovation

Accurate and reliable cryogenic temperature measurements are needed for a number of NASA applications. Currently available sensors are either not reliable enough in corrosive environment or offer limited temperature resolution at cryogenic range. MicroXact Inc. is proposing to continue the development of a multiplexible fiber optic temperature sensors solution to provide accurate (<100mK), fast (>10ms update rate), reliable, harsh environment-compatible measurements of cryogenic flows and cryogenic tanks. Phase I resulted in unambiguous proof feasibility of the proposed approach and in Phase II MicroXact proposes to optimize the fabrication procedures to meet program objectives. The proposed technique will provide an ultimate solution for NASA and other customers.

Expected TRL Range at the end of Contract (1-9): 5





Technical Objectives and Work Plan

Technical Objectives:

- O1 ï Develop the CuO/epoxy nanocomposite coating.
- O2 ï Demonstrate nanocomposite fiber coating.
- O3 ï Design the temperature measurement solution for NASA applications.
- O4 ï Develop strategies for product commercialization and transition to manufacturing.

Work Plan:

- Task 1 ï Develop CuO/epoxy nanocomposite.
- Task 2 ï Demonstrate elastic properties of nanocomposite at cryogenic temperatures.
- Task 3 ï Develop nanocomposite fiber coating.
- Task 4 ï Demonstrate performance of single-point fiber optic sensor at cryogenic temperatures.
- Task 5 ï Design the temperature measurement solution for NASA applications.
- Task 6 ï Develop the concept of Phase II, commercialization strategy, and transition to manufacturing.

NASA and Non-NASA Applications

- Temperature measurements in LOx and LH2 pipes (NASA).
- Liquid level sensing in cryogenic tanks (NASA).
- Cryogenic temperature measurements in various research or research& development applications (commercial).
- Temperature monitoring on superconductor power lines (DoE, CERN, etc.).
- Superconducting RF cavity temperature mapping (DoE).
- Temperature measurements on superconducting magnets (commercial, academia, government labs).

Firm Contacts

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